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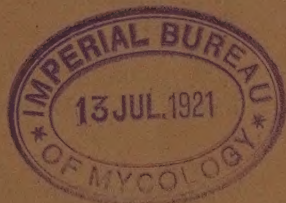
No. 1

# THE QUARTERLY BULLETIN

OF THE

## STATE PLANT BOARD

OF FLORIDA



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# THE QUARTERLY BULLETIN

State Plant Board of Florida

Vol. III

OCTOBER, 1918

No. 1

## A BRIEF HISTORY OF THE DISCOVERY OF CITRUS CANCKER IN JAPAN AND EXPERIMENTS IN ITS CONTROL

By

DR. TYZABURO TANAKA, Translator  
U. S. Dept. of Agriculture

Citrus scab, otherwise known as verrucosis or Orange-leaf scab, is one of the commonest diseases of the mandarin and tangerine in Japan. When applied to orange fruits it is called "Kasa" and it is widely mentioned by the Chinese name, Sôkabyô. Affected fruits are even designated in early citrus literature as though a special type of mandarin, as "Kasa Mikan". An illustration in the manuscript work "Nankai Hôfu" (Orange of South Sea Districts, written by Yamanaka Shinko, revised by Uemachi Kunihiko, preface 1865. 2 v. in 3 books. Colored plates), (which has a profound reputation as the early standard work on Japanese Citrus), shows the fruit of Satsuma orange affected by scab, nicely drawn, together with healthy fruits of Nyûkitsu or Unshû Mikan (Satsuma). It is doubtless true, however, that Japanese citrus growers had paid little attention to the scab disease of mandarins before a similar disease of Navel orange was found in Kyûshû Island in 1899 or about that date.

This disease of Navel orange in question was not found anywhere before the cultivation of this orange commenced in the commercial area devoted to citrus fruit in Japan. According to a statement of Toshichika Tamura<sup>(1)</sup> the Navel orange was first introduced into Japan from California in 1890 by Prof. Tamari, the present director and professor of the Kagoshima Imperial Agricultural and Silvicultural College, but the imported plants failed to grow where planted. In 1891 an important introduction was made by Sanjirô Senda, who was sent to the United States from one of the citrus trading companies of Naka-gun, Wakayama-ken, bringing home two healthy plants which were secured in California through the assistance of Yono-shin Dômoto. One of the stock plants was successfully grown

<sup>(1)</sup>Tamura, T., Nippon Engei Zasshi (Journ. Hort. Soc. Japan), No. 131, pp. 3-9, Apr. 1903.



by Sen'emon Horiuchi of the same province, who made a considerable propagation from it, plants of which have been distributed all over the citrus growing prefectures of the Empire.

The earliest discovery of a pest on this variety identical with what is now known as "Citrus Canker" was reported as "a kind of pathogenic microbe" by Mr. Kumanoshuke Abe, in his elaborate work "Nippon no Mikan" (Citrus in Japan), published in May, 1904, pp. 162-165. Mr. Abe was the first to engage in orange growing in Kyûshû (Southern) Island. He acquired a thorough knowledge of the industry by travels throughout the orange growing regions for more than twenty years and his standing as a member representative of the Imperial Parliament and as a founder of the most active organization of the agricultural community of Fukuoka-ken, lends special weight to his excellent work on citrus culture. This work takes authoritative rank and is the only publication of this nature which has been honored by the Meiji Emperor becoming one of its readers.

Mr. Abe's description is quite definite and there can be no doubt that he first found the infection on Navel oranges in Tanushimaru, a nursery district of the Fukuoka prefecture, in 1899 on the stocks from Wakayama-ken, possibly brought from those propagated by Mr. Horiuchi in Naka-gun. He defined this infection as a new disease caused by an unknown organism and the opinion was accented by Prof. Tamuri, who was known at that time as one of the most enthusiastic supporters of the Navel orange industry of the Island.

To quote briefly: "The first symptoms that appear are on the under surface of the leaves and are small rusty colored spots a little elevated from the surface. This spot is easily transmitted to the other foliage developed in the same year; also attacks the shoots, causing destruction of this part of the tree. \* \* \*

"In the nursery of Tamushimaru there are many plantations of Satsuma trees which, in many cases, surround the Navel nurseries; no infections were discovered on the Satsuma, even where Navels were attacked rather severely by the disease. Other varieties like Natsu-daïdai, Yamabuki-Mikan, and the trifoliate orange, all of them considered to have similar habits to the Navel orange, were found to be slightly affected by the disease, and the susceptibility of the navel orange is also considered due to the softness of the twigs, leaves and bark. \* \* \*

"The severity of the organism is more pronounced in the wet years and spreads more rapidly at such times. As to methods of

prevention and extermination, it has not been sufficiently experimented with as yet; but it would be wise to take the precaution to burn up all diseased leaves and twigs, which should be cut off and collected immediately upon the discovery of the affection. The application of Bordeaux mixture once in the springtime and once more in the winter season is recommended for the prevention of the disease."

The infection was found very severe everywhere in the northern part of Kyûshû Island during this period and the incessant questions sent in by the growers caused considerable alarm among the officials of the sub-station of the Imperial Agricultural Experiment Station located at Kumamoto, not far from the place where the disease was raging. This fact is fully illustrated by the statement of Umenojo Bokura<sup>(2)</sup>, assistant pathologist of the central station, quoting a letter received from the sub-station dated January 9, 1903, the translation of which follows:

"In connection with the swift development of the Navel orange cultivation in Kyûshû Island, a kind of disease, as is seen from the specimen enclosed, is gradually spreading over the cultivated area, which seems to be prevalent on sweet oranges, not showing marked effect on Japanese mandarins, leading us to consider it as one of the most undesirable of diseases and of dangerous nature. It seems to attack young plants mostly and young orange stocks of one or two years old are often found dying from the infection. The affection also can be found on grown trees, usually on branches and on fruits. The fruits make a poor appearance spoiling their value as market fruits. \* \* \*"

As an official of this sub-station, Dr. Tôji Nishida, now the inspector and chief of the Kôbe sub-station of the Imperial Plant Quarantine Station, published an article in the Journal of the Agricultural Society of Japan under the title "Kankitsu no Sôkabyô" (Citrus Scab)<sup>1</sup> giving a similar description of the disease as reported by a local grower in conversation.

In this article Nishida did not attempt to describe the disease to any extent, hastily comparing this with and identifying it as the same disease which was first described in the United States as Citrus Scab, caused by *Cladosporium Citri*, figured in articles by Lamson-Scribner, G. Massee, and Messrs. Swingle and Webber. His determination was chiefly made from the descrip-

<sup>(2)</sup>Bokura, Umenojo, Kankitsunae to Kwaiyôbyô (Inspection of Citrus stock with special attention to Citrus Canker), Byôchû-gai Zasshi (Journ. Plant Protection) 4, No. 11:838-843, Nov. 1917 (Japanese).

<sup>1</sup>Nishida, Tôji. In Dainippon Nôkwaihô (Journ. Agr. Soc. Japan), No. 258:1-4, Feb., 1903.



tion and illustrations by Lamson-Scribner (Rept. Comm. Agr., 1886, issued 1887, pp. 120-121, pl. 4), according to a later statement by him,<sup>1</sup> but whatever be the opinion about the cause of the disease, this article bearing the date February 1903, seems to rank as the first Japanese publication relating to Citrus Canker, preceding by more than one year the publication by Mr. Abe.<sup>1</sup>

According to Bokura, there has been a number of similar communications from localities other than Kyûshû Island. The Kogoshima-ken Agricultural Society reported the occurrence of the disease in the prefecture about the year 1902 and in Shidzuoka-ken, Shinsaku Kano and Kisaku Oda of the village Asahatamura, Abe-gun, reported as early as 1899 or 1900 the occurrence of a similar trouble on plants brought from Wakayama-ken propagated by Mr. Horiuchi. We have no evidence of the occurrence of this disease in the original planting in Wakayama-ken or in the prefecture at this time, it being stated by Mr. Abe that he found no disease there at the time he discovered it in Kyûshû Island.

In Naka-gun the prevalence of the disease was called to the attention of the prefectural officials, as shown in the following letter from the Ken Nôkwai (Prefectural Agricultural Society) to the Imperial Central Experiment Station, dated Oct. 31, 1904. This is also published by Mr. Bokura in the same article. The translation is as follows:

"In Arakawa-mura, Naka-gun, of our prefecture, there started a new disease of Washington Navel orange which seems to be rather serious to the growers of the Navel oranges and we are very anxious to take prompt steps to exterminate this disease as far as possible. We desire to have the immediate consideration of your officials on this matter and trust to have proper suggestions in regard to the nature and the possible method of control for the disease. We are enclosing a statement of the present condition of the disease in the prefecture and sending a few specimens of the infected fruits and leaves by parcel post.

<sup>1</sup>\_\_\_\_\_, Sôkabyô to Kwaiyôbyô (Citrus Scab and Canker), Kwaju (Fruit Tree), No. 152:29-32. Illus. Nov., 1915. See Phytopathology.

<sup>2</sup>No mention is made in Mr. Abe's work as to why his publication was delayed until the middle of 1904. As Viscount Kanô mentions it in his preface dated February 8, 1901, it must have been completed prior to that time. It could not have been later than January, 1903, when the book was ready for publication, according to the date in the author's preface, so his statement as to the pest on Navel oranges undoubtedly antedates Nishida's publication. Mr. Abe does not give any description of Citrus Scab but emphasizes the distinct nature of the new disease in very clear statements unlike later articles which thoroughly confuse it with the common scab of mandarin and lemon.

1. The locality of the infection found.—Arakawa-mura. Wakayama-ken and the vicinity.
1. The acreage of the infection.—About 12 Chô (30 acres).
1. Infected plants.—Navel orange, Satsuma, and Trifoliate orange.
1. Age of plant affected.—Young stocks as well as grown plants 7 or 8 years old. No apparent difference between the young and grown trees.
1. General remarks on the disease.—Most severe in Washington Navel orange, also found on Satsuma and trifoliata to some extent. The infection occurs mostly on young plants, particularly infecting the fruits, not only attacking the leaves and twigs. The young leaves fall off as soon as the infection starts, and the fruits never show full maturity even at the time of ripening. Those fruits cannot be kept in the storehouse as decay starts immediately from the infected spots.
1. The extent of the damage.—20 to 30 fruits out of 50 from one tree were found infected in the severest case, some trees have only 5, 6 or 10 out of 50 in cases less affected.
1. The occurrence in previous years.—According to some ambiguous statements it was found two years before last, but it would be more correct to say that it was found in the year before last by a few people of the same place. This is the first year that the disease revealed itself as a dangerous infection.

In concluding this passage Mr. Bokura says: "In consideration of these data derived from all communications and published articles, we may conclude that the first occurrence of this disease in Japanese territory was a few years before 1900, its devastation gradually spreading during 1900 and 1901 with the result of attracting the attention of the local growers."

In the previous article of Mr. Bokura the first discovery in Arita County is given as in 1904, based on a verbal statement of Mr. Den Yabune, a famous citrus grower of the same county. He refers to a report written by Umekichi Hashimoto, Shûsaku Aoki, and Nishigaya, sent as the representatives of Shidzuoka growers to inspect citrus conditions, which was published under the title "Wakayama-ken Kankitsugyô Chôsa Hôkukusho" (Report on the citrus industry of Wakayama-ken) and appeared in 1904. The translation of the passage is made as below:

"Mr. X (it is told that this was Mr. Yabune) said, there is a



new disease of Navel orange which has just been discovered this year in the Navel orchard. The symptoms shown by the disease are blackish-brown spots on leaves and the young buds, causing yellowing and withering of the leaves and defoliation as a consequence. Fruit infections follow immediately afterwards, which is characterized by yellowish-brown or reddish-brown spots, slightly depressed at the center of the infection. When such spots appear abundantly it causes the fruit to change to a yellow color and soon afterward such fruits begin to drop from the tree. The nature of the disease seems to be serious in every respect, the cause of which is entirely unknown. \* \* \* "

Mr. Bokura's interpretation is that this is an "undoubted case of the infection of Citrus canker as far as the symptoms show, and Mr. Aoki, one of the writers, told me that it was a real canker".<sup>(6)</sup>

From Shikoku Island, the disease is also reported by N. Yano<sup>(7)</sup>, who started a close examination after his return from Kyûshû Island following a visit to Mr. Abe's orchard which he made in 1902. He states that he never found the disease until 1905 when the disease was discovered in a Navel orchard in Kita Uwa-gun of the Ehime prefecture. He also states that the disease must have been introduced to the island about 1902 from Wakayama-ken and Hyôgo-ken prefecture with the Navel stocks. His first report was issued in the "Gyômu Kôtei" (Annual report of the Ehime-ken Agricultural Experiment Station), published in 1904.

In response to many questions from those interested in horticultural industries, Prof. Tetsuya Onda, the Chief of the Imperial Horticultural Experiment Station, Okitsu, Shidzuoka-ken, expressed the opinion that the scab attacking the Navel orange was quite distinct from that which infects the Kunembo (King orange) and Satsuma<sup>(8)</sup>.

His article is written to convince the growers of the satisfactory results of Bordeaux spray for the purpose of preventing Citrus scab of Satsuma orange, summarizing the experimental results which were obtained at his station since 1903, and giving no detailed differences between these diseases. However, he gave his opinion about the definite nature of the disease, which should not be confused with the common scab, in saying: "It

<sup>(6)</sup>See (3) p. 841.

<sup>(7)</sup>Yano, N., in Iyo no Engei (Hort. of Iyo province) 2:no.2.p.14-17, Jan., 1915. Full translation by Tanaka, see file.

<sup>(8)</sup>Onda, Tetsuya, Kankitsu no "Kasa" Byô ni tsukite (On scab disease of Citrus) in Kwaju (Fruit trees) no. 39:20-23, 40:16-19, Jul.-Aug., 1906. (Japanese). See no.40.p.22



is absolutely baseless to consider that the scab of Navel orange exists in all localities where the variety is under cultivation. Not a single plant of Navel orange stock did I find showing any infection of the disease in the prefecture of Kagawa-ken, which I visited lately and carefully inspected the plantings in Kinashi, Hasioka districts of Ayauta-gun and also in other counties. This is rather a surprising fact for the consideration of the believers in the common occurrence of the disease"<sup>(9)</sup>.

In the second article of Dr. Nishida<sup>(10)</sup>, the distinction between the symptoms on these different varieties is clearly given with illustrations. He maintains strongly, however, the identity of the organism which causes these diseases whatever may be different in the symptoms. The most important passages of the article are translated as below:

"There has been reported to me a difference existing in the scab diseases of Navel orange and Natsu Daidai, and of Satsuma. It may be true that the symptoms widely differ \* \* , but it is not a rare instance that one disease may show a difference in symptoms when appearing on different hosts. I rather incline to say both are caused by the same organism, and can be treated by the same remedies to prevent the occurrence in the orchard. The following is the reason to maintain my hypothesis:

1. The same organism is to be isolated from these different hosts. An inoculation experiment is in progress, and the determination of the species of the organism is also now under investigation.
2. The spots occurring on the parts of the same tree are always the same, the two never mixing on one tree.

In discussing further the history of the Citrus canker in Japan, Dr. Nishida cites<sup>(11)</sup> the paper of Prof. S. Hori, Pathologist of the Imperial Central Agricultural Experiment Station, in a monthly journal "Nippon Nôgyô Zasshi" (Japanese Agricultural Journal) No. 6 and 7, Feb. and March of 1914, in which is mentioned the scab disease of Navel orange, reporting the isolation of some certain kinds of fungi, *Leptosphaeria*, *Ramularia*, and others. Nishida also mentions that this disease is specialized by the name Marugata Sôkabyô in the explanatory text of the exhibited specimens and charts represented at the Taishô Exhi-

<sup>(9)</sup>Onda, Tetsuya. *Nevuul Kan ni tsuite* (On Navel Orange). In Kwaju (Fruit trees) 45 p.8. Apr., 1907. (Japanese).

<sup>(10)</sup>Nishida, Tôji. *Futatabi Kankitsu no Sôkabyô ni tsukite* (Again on the Citrus scab) in Kwaju (Fruit Trees) no. 42:6-10, illus. Oct., 1906.

<sup>(11)</sup>See Nishida (5) p.30.

bition, held in Tôkyô in 1914. The plate according to Nishida published in the Byôchûgai Zasshi (Journ. Plant Protection) 2: no. 1 (Jan. 1915) is one photographed from the exhibited chart which evidently shows the drawings of infected Navel orange with the Satsuma, under the general name Mikan Sôkanyô (Citrus scab) and Nishida also interprets that the picture of the pathogenic organism figured in this chart is the fungus belonging to the genus *Cladosporium*.<sup>(12)</sup> It was not until November 1914 that the definite name Kankitsu Kwaiôbyô was created to correspond with the American term Citrus Canker, a report on which, written by Stevens (Florida Agr. Exp. Sta., Bull. 122, March, 1914) is reviewed by Dr. Nishida in his work "shinpen Kankitsu Byôgai to Yobôhō (New treatise on Citrus diseases and methods of prevention)", published on Nov. 25, 1914, (see pp. 171-184).

This chapter, according to the postscript, was added after the print blocks of the previous part were prepared, and no change in the chapter on "Citrus Scab" is to be found in this work, where the infection of Navel orange is given as caused by the same organism which affects Satsuma orange.

Nishida also states that he received a specimen of infected trifoliolate orange from F. A. Wolf of Alabama Polytechnic Institute through Prof. Kusano of the Tôkyô Imperial Agricultural College, but does not mention any observation of the microscopic character of the infecting organism. In addition to this statement he quotes a communication from B. F. Floyd, of the Florida Agricultural Experiment Station, to whom Nishida sent specimens of infected Navel orange fruit and leaves, which brought the reply that it was a real Citrus Canker!

In the meantime, Prof. Hori published a long article in connection with the discovery of Citrus Canker in the United States. He gives a review of the article written by Wolf and Massey (1914, Circ. No. 27 Alabama Exp. Stat.). Preceding the review<sup>(13)</sup> Prof. Hori's article deals with correspondence with the Alvin Nursery Company, Grand Bay, Alabama, and gives warning to the Japanese citrus exporters and growers to pay immediate attention to diseases of a similar nature occurring on the Japanese Navel oranges. He stated: "At present I doubt

(12) See Nishida (5) p. 30.

(13) Hori, Shôtarô Hokubei Mekishikowan Engan Chihô ni oite Nippon-san Kankitsunae Haiseki no Hô ari, aete waga Kankitsu Saibaisha oyobi Yushutsu-gyôsha ni Keikohusu (Warning to the Citrus growers and exporters of Japanese Citrus stocks to the Gulf Coast, on account of the occurrence of a new disease found on the imported plants). In Byôchû-gai Zasshi (Journ. Plant Prot.) 2 no. 1: 1-7. Jan., 1915. (Japanese.)



whether the disease in question exists in Japanese territory \* \*, but as the symptoms of the reported disease so closely resemble those which occur on Navel orange in Japan, which have already been described by the writer as Enkei Sôkabyô (round scab), we should take immediate steps to find out whether they are the same or different. The organism which causes the latter I considered a species belonging to *Cladosporium*, but it has not been as yet decided. The infection of trifoliate orange, which is more common in western part of Japan than in eastern, also shows microscopic similarity with the one reported from the United States. This should also be promptly investigated \* \* \* ”.

The next number of Byôchûgai Zasshi<sup>(14)</sup> gives a provisional translation of Plant Quarantine Act No. 19 of the Federal Horticultural Board of the U. S. Department of Agriculture, issued on Dec. 10, 1914, and, as an editorial note, repeats the warning to the exporters and the growers to pay “full attention to all kinds of diseases, to use sufficient methods of precaution for preventing the spread of infection both for the purpose of self-protection and for the interest of other nations”.

In the review of Miss Hasse's paper on the discovery of bacterial origin of the canker<sup>(15)</sup>, Mr. Bokura gives an interesting note about a similar discovery made by the pathological laboratory of the Imperial Agricultural Experiment Station. The full translation of the note is as follows:

“As to the organism causing this disease, previous opinion chiefly centered on *Cladosporium Citri* and *Phoma Aegles* without basing conclusions upon any inoculation experiments. Acting upon the evidence demonstrating the distinct nature of the disease from the ordinary scab as shown in the experimental results of the Alabama Experiment Station, Prof. Hori started to collect material from various parts of Japan. In examining this material in the laboratory, he soon discovered the existence of a certain kind of bacterium in the diseased tissues and consequently he issued an order immediately to Dr. Nishiyama, an employee of the laboratory, to isolate it and to conduct an inoculation experiment in the experimental farm. This was in January 1915. Soon afterward it became known through Mr. Swingle, who happened to be on a visit to Japan at that time,

<sup>(14)</sup>Beikoku no Gwaikokusan Kankitsu Yunyû Kinshi (Prohibition of the importation of Citrus from foreign countries into the United States) in Byôchû-gai (Journ. Plant Prot.) 2 no. 2:1-2, Feb., 1915.

<sup>(15)</sup>Bokura, Umenojo. Kankitsu Enkei Sôkabyôgen ni tsukite (On the cause of the Citrus canker), “H. Hasse, *Pseudomonas Citri* cause of Citrus canker, Journal of Agricultural Research, Vol. IV No. 1, p. 97, 1915” in Byôchû-gai Zasshi (Journ. Plant Prot.) 2 no. 9:46-47, Sept. 1915.

that Miss Hasse had cabled to him telling of her discovery of a bacterium as the cause of the disease. The name of the bacterium as given by her (*Pseudomonas Citri*) was also made known by Mr. Swingle. Entirely independent of this discovery, Prof. Hori's bacteriological experiments are still progressing under the careful investigation of Dr. Uyeda, the bacteriologist of the station."

Nishida and Hori also mention the detection of and experiments relating to the pathogenic organism of Citrus Canker<sup>(16)</sup> by Dr. Uyeda<sup>(17)</sup> but no report has been issued by Dr. Uyeda as yet.

As to the discovery of Citrus Canker on Satsuma orange, Nishida made a most important report in 1915<sup>(18)</sup>. He found two different kinds of infection on the same Satsuma orange leaf. This was detected in an orchard located in Aki-machi, Kôchi-ken, Shikoku Island, which was sufficient to cause him to withdraw his former opinion that the organisms causing Citrus Scab and Canker were identical.

In reply to a question of the writer, viz., on what variety of Satsuma orange he first found canker, he states in the letter dated January 8, 1918, that the infection of Satsuma is really a question of the severity of the infection of the surrounding orchards in which infected plants of Navel oranges and Natsu Daidai are to be found. He further says: "I do not claim the entirely resistant nature of the Satsuma variety. It is a matter which largely depends upon the environmental condition and the habit of growth of the twigs. Satsuma is usually grown on terraces; that gives the best opportunity to get rid of the infection. Satsuma does not produce as much summer growth as others, which is another reason for escaping from the severe summer infection. This can be proved by the fact that so many infections of Satsuma orange were found during the last year when the surrounding orchards of Navel orange and Natsu Daidai were so badly infected by the disease, in the prefectures of Osaku-fu and Hyôgo-ken".

Before concluding this sketch it would be worth while to refer to the methods of combating Citrus Canker in Japan and the apparently successful results of controlling it, at least to some extent.

<sup>(16)</sup>See (5) p. 31.

<sup>(17)</sup>Hori, Shôtarô. Shokubutsu Byôgai Kôwa (Lectures on diseases of plants) vol. 2:288-289, Tôkyô, Seibido, Nov., 1916.

<sup>(18)</sup>See (5) p. 30-31.



In connection with the extermination experiment on Satsuma Scab started in 1903 in application of Bordeaux mixture as previously mentioned, the plan was made in Wakayama-ken Agricultural Experiment Station and in other local stations, to adapt this method to the disease of Navel orange (the so-called "scab" or canker), which plan was started in 1909 in the orchard of Horiuchi, the first successful importer of Navel orange, previously mentioned.

The experiments lasted until 1912, and four reports were issued; the first<sup>(20)</sup> in 1910, and the last<sup>(21)</sup> in 1913. The following is the summary of the results as given in the final report:

Percentage of the annual decrease of infected fruits as compared with infection in 1909; each lot consisting of five trees 11 years old at the beginning of the experiment. (The results of spraying for three years—1910, 1911, and 1912—averaged percentages).

## I. SPRING SPRAY (22)

Lot	Time of Spraying	"Nito Goshō" Bordeaux	"Sando" Bordeaux	Sugar Bordeaux	Average	Efficiency Grade
1	Immediately after bloom and two weeks later.....	15	22	28	22	4
2	Shortly before the bloom, immediately after the bloom, and two weeks later.....	16	25	28	23	3
3	Immediately after bloom, two weeks later, and four weeks later.....	34	28	22	28	1
4	Shortly before the bloom, immediately after bloom, two weeks later and four weeks later.....	24	30	23	26	2
	Average of percentages for each spray.....	23	26	25	—	—
—	Efficiency; grade.....	3	1	2	—	—

<sup>(20)</sup>Wakayama-kenritsu Nōji Shikenjō (Agr. Exp. Stat.), Nōji Shiken Seiseki Hōkoku (Bulletin) No. 2, for the fiscal year 1909, issued Nov. 1910, p. 79-83.

<sup>(21)</sup>..... Rinji Hōkoku Kanritsu no. Bu. (Prelim. Rept. on Citrus experiments'. Jul., 1913, p. 47-62, and Nōji Shiken Seiseki (Bulletin n. ser. No. 5, Aug. 1913, p. 47-62.

<sup>(22)</sup>The standard Japanese Bordeaux mixtures described in the Imp. Agr. Exp. Sta. Abridged Bull. No. 20, pp. 1-10 (issued Jun. 1911) are as follows:

Standard weight of chemicals } Copper sulphate 120 momme (approx. 1 lb.),  
in ordinary Lime Bordeaux } Stone lime 100-120 momme (0.83-1 lb.)

Water { "Nito Shiki" : 2.0 To (approx. 9½ gal. (0.83-1 lb.)  
Dilution { "Nito Goshō Shiki" : 2.5 To approx. 12 gal.) 1 "To"=approx. 4¼ gal.  
              { "Sando Shiki" : 3.0 To (approx. 14¼ gal.)

Sugar Bordeaux { Copper sulphate 100 momme (0.83 lb.)  
                      { Stone lime 100 momme (0.83 lb.)  
                      { Cane sugar 50 momme (0.41 lb.)  
                      { Water 2.0-2.5 To (9½-12 gal.)

## II. SUMMER SPRAY

Lot	Time of Spraying	"Nito Goshō" Bordeaux	"Sando" Bordeaux	Sugar Bordeaux	Average	Efficiency Grade
5	The time when the summer shoots appear, and two weeks later .....	32	24	24	27	1
6	The time when the summer shoots appear, two weeks later, and four weeks later....	19	30	26	25	2
—	Average .....	26	27	25	—	—
—	Efficiency; grade .....	2	1	3	—	—

The percentage of the affected fruits in the control lot is given as follows:

	1909	1910	1911	1912	Average decrease
Lot 7	100	100	99	81	7

The results show that no matter which fungicide is used, the sprayed lots had less infection than the unsprayed. At the beginning of the experiment, nearly all fruits examined were found 100 per cent infected in every lot, but where sprayed the percentage dropped off considerably in the following two years. There was also found, not only a decrease in the number of infected fruit, but a decrease in the severity of infection of individual fruits that is quite remarkable.

As to the time of spray, the application given twice in the summer season is nearly as effective as spraying three times in the spring season; the former method is both a saving of labor and reduces the expense for chemicals. The strength called "Sando Shiki" Bordeaux showed the best result in the long run and is also the cheapest of all the spray dilutions used.

Similar experiments were conducted at the experiment stations of Kōchi-ken, Nagasaki-ken, and Shidzuoka-ken.

The summary of four years' results of the experiment conducted by the Kōchi-ken Agricultural Experiment Station is as follows:

1. Trees used in experiments.—Washington Navel orange, 10 trees in each lot.
2. Object of experiment.—To find out which fungicide is most effective in reducing the severity of the infection of Citrus Canker.



## 3. Spraying times used in different experiments—

- (1) April 15.
- (2) April 27.
- (3) April 29.
- (4) At the time spring buds coming out.
- (5) May 26.
- (6) At the time when fruit is grown as large as a pea.
- (7) June 2.
- (8) June 23.
- (9) Three times; spring, summer and autumn shoots are coming out.

## EXPERIMENTAL RESULT

	1913 (23)		1914 (24)		1915 (25)		1916 (26)	
Kinds of Fungicide	Spraying times	Infected fruits %	Spraying times	Infected fruits %	Spraying times	Infected fruits %	Spraying times	Infected fruits %
Lime Bordeaux "Sando Shiki"	(3) (7)	1.5	(4) (6)	46.0	(4) (6)	75.0	(1) (1) (2) (1) (2) (5)	0 3 0
Lime Bordeaux "Sando Shiki"	(3)	17.2	(6)	43.1	(9)		(1) (2) (3) (4)	0
Lime Bordeaux "Nito Shiki"	(3) (7)	0.5	(4) (6)	72.7	(4) (6)	83.		
Lime Bordeaux "Nito Shiki"	(3)	1.5	(6)	48.1	(6)	79.		
Lime-sulphur mixture Sp. G 0.5 degree	(3) (7)	9.9	(4) (6)	83.3	(4) (6)	96.		
Lime-Sulphur mixture Sp. G 0.5 degree	(3)	19.1	(6)	69.1	(6)	92.		
Lime-sulphur mixture Sp. G. 1.0 degree	(3) (7)	14.2	(4) (6)	69.7	(4) (6)	88.		
Lime-sulphur mixture Sp. G. 1.0 degree	(3)	17.5	(6)	85.3	(6)	87.		
Control (no application)		14.1		80.5		86.		11.

<sup>(23)</sup>From the review given in Byôchû-gai Zasshi (Journ. Plant Prot.) 2,no.4:60, Apr. 1915.

<sup>(24)</sup>Kôchi-Kenritsu Nôji Shikenjô (Agr. Exp. Stat.) Taishô Sannen-do Gyômu Hôkoku (Ann. Rept. for the fiscal year 1914), issued May 1915.

<sup>(25)</sup>\_\_\_\_\_, Taishô Yonendo Gyômu Hôkoku (Ann. Rept. for the fiscal year 1915), issued Apr. 1916.

<sup>(26)</sup>\_\_\_\_\_, Taishô Gonendo Gyômu Hôkoku (Ann. Rept. for the fiscal year 1916), issued Apr. 1917.

The results show no positive effect of spraying in years when the infection is very severe and is only relative when the infection is slight in comparison with average years.

From the results obtained at the Experiment Station of Shidzuoka-ken during the fiscal year 1911 and 1912, the effect of spraying is summarized as follows:

"The spraying experiment with "Sando Shiki" Bordeaux mixture three times a year (March, June and July) was most successful among the series of experiments where more than 50 per cent of fruit were protected from infection."<sup>(27)</sup>

"In all cases the sprayed lot showed better results than the control. Among the sprayed lots, three applications (1) middle of April, early in June, late in July, and (2) middle of April, late in July, early in August, show better results than any others, which demonstrates the efficiency of spraying with Lime Bordeaux mixture in preventing the scab disease of Navel orange."<sup>(28)</sup>

The experimental results obtained at the Nagasaki-ken Agricultural Experiment Station are as follows:

I. <sup>(29)</sup>SPRAYED WITH "NITÔ GOSHÔ SHIKI" LIME BORDEAUX

Spraying Times	Infected fruits		Percent light	No infection percent
	Severe	Medium		
1. Preceding the flower, After the flower.	2.9	2.9	64.2	30.0
2. Preceding the flower, Preceding the summer growth,	3.7	6.5	57.9	31.9
3. Preceding the spring growth, After the flower, Preceding the summer growth,	1.4	8.3	31.2	59.1

A circular has very recently been issued by the Department of Agriculture and Commerce<sup>(30)</sup> of Japan giving a summary of the present knowledge of Citrus Canker both in Japan and in the United States, the history of its occurrence, nature of the disease and possible methods of prevention in the orchard. This circular records its first occurrence in various prefectures not generally given in published articles, which may be briefly summarized as follows:

<sup>(27)</sup>Shidzuoka-kenritsu Nôji Shikenjô (Agr. Exp. Stat.), \* \* \* Gyômu Kôtei (Ann. Rept.) for the fiscal year 1911. Issued Nov., 1912. p. 68.

<sup>(28)</sup>\_\_\_\_\_, do. for the fiscal year 1912. Issued October 1913, p. 119.

<sup>(29)</sup>Nagasaki-kenritsu Nôji Shikenjô (Agr. Exp. Stat.), Nôji Shiken Seiseki Hôkoku (Bulletin) no. 17. Issued Feb., 1914. p. 162-163.



1900, Shidzuoka prefecture (Village Asahata, Abe County) on Navel.

1902, Nagasaki prefecture, on Navel.

1903, Saga prefecture (Township Ogi) on trifoliolate.

1904, Kumamoto prefecture, on Navel.

1906, Oita and Miyazaki prefectures, on trifoliolate.

1907, Mie and Aichi prefectures, on Navel.

The following varieties are mentioned as susceptible:

Navel oranges.

Natsu Daidai.

Trifoliolate orange.

Pomelos.

Sweet oranges.

Blood oranges.

Varieties slightly infected:

Kunenbo (this is *Citrus nobilis* proper, or King orange).

Yamabuki (a variety with soft pulp and pithy rind of pomelo-like appearance).

Lemons.

Fingered citron (*Citrus Medica* var. *sarcodactylis*).

Varieties strongly resistant, occurring sometimes on leaves but exceptionally on fruits:

Unshû-mikan (Satsuma orange).

Kishû-mikan (Kinokuni mandarin).

Yuzu.

No natural infections ever found, but may be artificially infected, causing a development of minute pustules of about 0.3-0.6 mm. in diameter:

Kinkan-ruî (Kumquat group).

According to this publication, the Japanese government has recently resolved to take immediate action along the same lines as the plant quarantine act of the United States government; to conduct an investigation of the actually infected localities and to issue certificates for the export of fruit which is certified by local inspectors both as absolutely canker free and produced in a canker-free district. The government will pay part of the expense needful in carrying out this new program. It is believed that this action will arouse Japanese growers to the necessity of taking the necessary steps to exterminate this pest, or to prevent its further spread.

<sup>(80)</sup>Nôshômushô Nômukyoku (Bureau of Agric., Dept. Agr. & Commerce), Kankitsurui Kwaiyôbyô (Citrus canker) issued as circular dated Dec. 1917. Reprint in Nippon Engei Zasshi (Journ. Hort. Soc.) 30 no.3:6-14, 1 fig. Mar., 1918. (Japanese).

**CABBAGE WORMS**

E. W. BERGER

Without undertaking to describe the several kinds of worms (caterpillars) that feed on cabbage in the field, the principal remedies for destroying them will be given. While there are at least five caterpillars (worms) that injure cabbage by devouring parts of the leaves, a worm is a "worm" in that respect, and what the grower wishes to know is how to kill it. And who is there that does not know a "worm" when he sees it! However, cabbage worms may be the caterpillars of either moths or butterflies.

Arsenical poisons are now the standard remedies for cabbage worms. These are best applied as a spray, but may be applied in dust form mixed with one to several parts of hydrated lime or other dust, when the plants are wet. When applied as a spray they adhere best if some soap is mixed with them. Any kind of spray pump, sprinkling can or whisk broom may be used to apply the spray. For applying dust mixtures blowers, made for that purpose, may be used, or the material shaken onto the plants from suitable cloth sacks.

It is not known that anyone was ever poisoned by eating cabbage that had been sprayed or dusted with arsenicals, and thousands of acres of cabbage are now being protected against cabbage worms in that way; but it is best not to apply these poisons when the heads are ready, or nearly ready, to harvest.

The following formulas are recommended:

1. Paris green 1 lb., water 50 gallons, soap 5 or 6 lbs.
2. Lead arsenate 2 lbs. (powdered), water 50 gallons, soap 5 or 6 lbs.
3. Zinc arsenite 2 lbs. (powdered), water 50 gallons, soap 5 or 6 lbs.

The following remedies are also frequently recommended:

Dust plants with air-slaked lime with which a little salt has been thoroly mixed. (Would suggest handful of salt to 2 gallons of lime.) This remedy may be used on cabbage that has headed, prior to selling. (Recommended by W. F. Massey in *Progressive Farmer*.)

Hot water, at a temperature of 130° F., applied with a sprinkling can, is also recommended against the young worms.

Hand picking the worms is frequently practiced in small patches or home gardens.

# DEPARTMENT OF CITRUS CANKER ERADICATION

## REPORT ON ERADICATION WORK FOR QUARTER ENDING SEPTEMBER 30, 1918.

The following report on the canker eradication work, conducted in co-operation with the Bureau of Plant Industry, U. S. Department of Agriculture, during the three months ending September 30, has been compiled by Mr. Frank Stirling, General Inspector:

### QUARTER ENDING SEPTEMBER 30, 1918.

Citrus grove trees inspected .....	1,593,836
Citrus nursery trees inspected .....	13,745,305
Inspectors employed .....	193
New properties showing infection .....	0
Total properties showing active infection .....	0
Grove trees found infected .....	0
Nursery trees found infected .....	0
Counties in which active infections were found .....	0

### GENERAL SUMMARY

Florida counties in which canker has been found .....	22
Grove trees found infected since May, 1914 .....	13,723
Nursery trees found infected since May, 1914 .....	342,254
Number of properties infected to September 30, 1918 .....	479
Properties declared no longer "danger centers" .....	437
Properties still classed as "infected" September 30, 1918 .....	42

The following table shows the number of citrus grove trees found infected with canker during each month from the beginning of the eradication work to September 30, 1918:

1914	1915	1916	1917	1918
	Jan. .... 306	Jan. .... 86	Jan. .... 14	Jan. .... 0
	Feb. .... 165	Feb. .... 21	Feb. .... 4	Feb. .... 1
	Mar. .... 444	Mar. .... 49	Mar. .... 9	Mar. .... 1
	Apr. .... 408	Apr. .... 49	Apr. .... 169	Apr. .... 2
May .... 108	May .... 1042	May .... 338	May .... 52	May .... 1
June .... 160	June .... 772	June .... 450	June .... 45	June .... 10
July .... 275	July .... 651	July .... 349	July .... 39	July .... 0
Aug. .... 1313	Aug. .... 1345	Aug. .... 219	Aug. .... 30	Aug. .... 0
Sept. .... 767	Sept. .... 618	Sept. .... 124	Sept. .... 6	Sept. .... 0
Oct. .... 565	Oct. .... 214	Oct. .... 451	Oct. .... 2	
Nov. .... 773	Nov. .... 494	Nov. .... 131	Nov. .... 1	
Dec. .... 366	Dec. .... 256	Dec. .... 27	Dec. .... 1	



## QUARANTINE DEPARTMENT

REPORT FOR QUARTER ENDING SEPTEMBER 30, 1918

The following reports on the inspections of shipments and importations, all ports and stations, have been compiled by Mr. K. E. Bragdon, Assistant Quarantine Inspector:

## PORT AND RAILWAY INSPECTION

## SHIPS AND VESSELS INSPECTED:

From foreign ports.....	424
From U. S. ports other than Florida.....	174
From Florida ports.....	193
Total .....	791

## SHIPMENTS INSPECTED:

Arriving by water:		Number of parcels
Passed .....	11815	
Treated and passed .....	97½	
Returned to shipper .....	113	
Detained, subject to return by shipper.....	0	
Contraband destroyed .....	616½	
		12642
Arriving by land—express, freight, wagons, etc.:		
Passed .....	1219	
Treated and passed .....	116	
Returned to shipper .....	69	
Detained, subject to return by shipper.....	30	
Contraband destroyed .....	27	
		1461
Total parcels inspected.....		14103

## PRINCIPAL PESTS AND DISEASES INTERCEPTED

Insect or Disease	Occurring on	From	Number of Parcels infested
<i>Aspidiotus</i> sp.....	<i>Globularia</i> sp.....	Spain .....	1
<i>Aspidiotra</i> scale.....	Soursop .....	Cuba .....	1
<i>Bephrata cubensis</i> .....	Soursop .....	Cuba .....	1
Black scale.....	<i>Pittosporum nigri</i> .....	California .....	1
Cerambycid beetle.....	Citrus .....	Jamaica .....	1
<i>Chaetopsis debilis</i> Loew .....	Beet .....	Cuba .....	1
Chaff scale.....	Citrus .....	Spain .....	1
Chaff scale.....	Citrus .....	Florida .....	1
Chaff scale.....	Palm .....	Louisiana .....	1
<i>Dictyospermum</i> scale.....	Palm .....	Florida .....	1
Dipterous larvae.....	Beet .....	Cuba .....	1
Drug store beetle.....	Unknown seeds .....	Spain .....	1
Florida red scale.....	Citrus .....	Florida .....	1
Florida wax-scale.....	<i>Chrysanthemum</i> .....	Alabama .....	1
Glover's scale.....	Citrus .....	Spain .....	1
Greedy scale.....	<i>Geranium</i> .....	Florida .....	1
Hemisphaerical scale.....	<i>Pittosporum nigri</i> .....	California .....	1
Hemisphaerical scale.....	Soursop .....	Cuba .....	1
<i>Hippelates pallidus</i> Loew.....	Beet .....	Cuba .....	1
<i>Lonchaea polita</i> Say.....	Beet .....	Cuba .....	1
Long-tailed mealy-bug.....	Beet .....	Cuba .....	1

Insect or Disease	Occurring on	From	Number of Parcels infested
Long-tailed mealy-bug.....	Croton .....	Pennsylvania .....	1
Mango fruit fly.....	Guava .....	Cuba .....	1
Mining scale.....	Mammee .....	Cuba .....	1
Oleander scale.....	Fern .....	Florida .....	1
Palm scale .....	Palm .....	Louisiana .....	1
Pineapple rot.....	Pineapple .....	Cuba .....	1
Purple mite.....	Citrus .....	Cuba .....	1
Purple scale.....	Citrus .....	Cuba .....	1
Purple scale.....	Citrus .....	Florida .....	2
Purple scale.....	Citrus .....	Honduras .....	1
Red spider.....	Begonia .....	Georgia .....	1
Red spider.....	Pepper .....	Georgia .....	1
Rufous scale.....	Citrus .....	Honduras .....	1
Soft scale.....	Beet .....	Cuba .....	1
Soft scale.....	Herbaceous plants.....	New Jersey .....	1
San Jose scale.....	Peach .....	Mississippi .....	1
San Jose scale.....	Plum .....	Mississippi .....	1
San Jose scale.....	Rose .....	Georgia .....	1
Termites .....	Sweet potato .....	Florida .....	1
Thrips .....	Chrysanthemum .....	West Virginia .....	1
<i>Tyroglyphidae</i> .....	Cassava .....	Cuba .....	1
Whitefly .....	Salvia .....	Ohio .....	1
Withertip .....	Citrus .....	Cuba .....	2

## PARCEL POST PLANT INSPECTION

## PARCELS INSPECTED:

Passed .....	62
Treated and passed .....	4
Returned to sender .....	0
Detained, subject to return by sender.....	1
Infested or infected parcels destroyed.....	0
Total parcels inspected .....	67

## PRINCIPAL PESTS AND DISEASES INTERCEPTED

Insect or disease	Occurring on	From	Number of Parcels infested
Florida red scale.....	Oleander .....	Florida .....	1
Nematode root-knot....	Begonia .....	Florida .....	1
Palm scale .....	Palm .....	Florida .....	1
Pustule scale.....	Oleander .....	Florida .....	1
Whitefly .....	Unknown shrub .....	Wisconsin .....	1

**WILSON T. DONALDSON, JR.**

It is with deepest sorrow that news of the death of Wilson T. Donaldson, Jr., was received by the staff of the State Plant Board. This excellent young man is another one of those to give his life in this, our country's time of need.

Mr. Donaldson was born at Owenton, Owen County, Ky., November 12, 1894. After attending the public schools he became a student in Transylvania College at Lexington, where he



pursued special studies for two years. Following this he entered the Mississippi Agricultural and Mechanical College, specializing in agricultural work and graduating in 1915.

On May 13, 1916, he was appointed inspector for the State Plant Board of Florida and Agent of the Bureau of Plant Industry, U. S. Department of Agriculture. In this capacity he rendered constant, efficient and faithful service in connection with the eradication of citrus canker in Florida until June, 1917. During the summer of 1917 he left for his home in Mississippi and shortly afterwards entered the School of Military Aeronautics at Austin, Texas. He completed the course with honors and entered upon his work at Kelly Field No. 2 at San Antonio with enthusiasm. He had been doing solo flying for about a month when, on April 17, 1918, while on a cross country flight,



he fell with his aeroplane and later died, on April 20th, having been unconscious from the time of the fall until his death. With military honors he was laid to rest on April 24th at Aberdeen, Mississippi.

On Kelly Field Mr. Donaldson was considered by his superior officers as an apt pupil. He lacked but a few days of receiving his commission at the time of his death.

Mr. Donaldson was a young man of high ideals and quickly earned the confidence and esteem of all those privileged to associate with him. In his death the State Plant Board has lost one of its most efficient workers and henceforth his name will be lovingly held in our memories as one who freely placed his all upon the Altar of Liberty.—F. S.

**THE ROLL OF HONOR**

The following employees of the State Plant Board of Florida are serving in the several branches of the military service as indicated:

Baker, Byrd O.....	Quartermaster Corps
Baker, Thos. J.....	National Army
Ball, Jos. H.....	Aviation Section
Barcus, Geo. D. ....	Aviation Section
Bass, Clarence A.....	U. S. N. R. F.
Bibby, F. F.....	Naval Dispensary
Branam, Jas. R.....	U. S. N. R. F.
Brown, A. C.....	Veterinary Section
Brown, Luther .....	Naval Hospital Service
Burden, Geo. F.....	Limited Service
Butts, John L.....	Aviation Section
Bynum, Eli K.....	Infantry
Calcote, Wm. H.....	National Army
Campbell, M. G.....	Quartermasters Dept.
Carothers, A. B.....	National Army
Cary, Chas. L.....	National Army
Chandler, Luther L.....	U. S. N. R. F.
Clark, Virgil I.....	U. S. N. R. F.
Dickerson, Wm. E. S.....	Infantry
Dickey, Edward K.....	Aviation Section
Dickson, Albert M.....	Officers Res. Corps
*Donaldson, Wilson T.....	Aviation Section
**Dukes, Redding A.....	National Army
Fish, Robert E.....	Aviation Section
Fletcher, J. M.....	Aviation Section
Fogg, Harry W.....	Eng. Service Battalion
Ford, Arthur E.....	Marine Corps
Goldsby, Jack K.....	Ambulance Corps
Green, Clifford .....	National Army
Grimes, D. W.....	Aviation Section
Hansen, Hans W. A.....	National Army
Harden, John C.....	National Army
Harkins, Donald L.....	Balloon Corps
Harn, Sam P.....	Navy
Harrison, Cyrus J.....	Aviation Section
Henderson, Francis M.....	National Army

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\*Killed while flying.

\*\*Died in camp.

Holland, Ed. Alton.....	Ammunition Train
Hood, Richard Van.....	U. S. Marines
Howell, John F.....	Officers Res. Corps
Ingram, Otis D. ....	National Army
Irwin, Harry M.....	Motorcycle Corps
Jackson, Henry C.....	Officers Res. Corps
Jackson, Julian.....	Mechanics Training Camp
Kersey, Walter L.....	Limited Service
Little, Floyd L.....	Aviation Section
Lovett, James C.....	Medical Corps
Maloney, Clarence B.....	Royal Flying Corps
McClanahan, Howard S.....	U. S. N. R. F.
McCullough, James D.....	National Army
Milledge, Stanley.....	National Army
Miller, Herbert L.....	Aviation Section
Moore, Joseph W.....	Navy
Moore, Jules B.....	National Army
Neal, Cecil G.....	Officers Res. Corps
Niedernhoefer, Wm. F.....	Aviation Section
Oliphant, Ross G.....	Tank Division
Parker, Frank R.....	Navy
Roberts, Samuel F.....	Naval Hospital
Robinson, Tom .....	Quartermasters Dept.
Robinson, V. K.....	National Army
Scott, Wm. J.....	Hospital Corps
***Seeds, Harvey W.....	National Army
Sherman, Chas. D. ....	Ambulance Corps
Smith, Clyde .....	National Army
Smith, Jos. G.....	National Army
Smith, Lawrence O.....	National Army
Steil, Fred H.....	Aviation Section
Stephens, Charley S.....	National Army
Stevenson, Geo. A.....	Navy
Swann, Porter R.....	National Army
Tedder, Geo. E.....	National Army
Thompson, Troy.....	National Army
Walker, Geo. S.....	Aviation Section
Wilson, G. H., Lieut.....	National Army
Wood, Harry E.....	Navy

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\*\*\*Missing in action.



# THE QUARTERLY BULLETIN

State Plant Board of Florida

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DEVOTED TO APPLIED ENTOMOLOGY AND PLANT PATHOLOGY  
IN GENERAL, WITH SPECIAL REFERENCE TO THE PREVENTION,  
CONTROL AND ERADICATION OF INJURIOUS INSECTS AND PLANT  
DISEASES IN FLORIDA.

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Sent free to all citizens of Florida. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers and other publications of a similar nature.

WILMON NEWELL, *Plant Commissioner*.....*Editor*

## ASSOCIATE EDITORS.

E. W. BERGER.....*Entomologist*  
F. M. O'BYRNE.....*Nursery Inspector*  
FRANK STIRLING.....*General Inspector*  
J. H. MONTGOMERY.....*Quarantine Inspector*  
H. E. STEVENS.....*Consulting Plant Pathologist*

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Entered as second-class matter November 14, 1916, at the postoffice at Gainesville, Florida, under the Act of June 6, 1900. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized July 10, 1918.

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THE CITRUS SEMINAR.—The Ninth Annual Citrus Seminar, held at Gainesville from September 24th to 27th, was an unqualified success. The most progressive growers of the State were in attendance and the interest was sustained throughout.

Though perhaps not generally known, the Seminar idea was conceived by the late J. A. Stevens of DeLand. It will stand an indestructible monument to this broad-minded man who was passing from our midst during the closing hours of this year's meeting. Though gone, he is not forgotten, nor will he be as long as the Seminar lasts.

While the Seminar idea was conceived by Mr. Stevens it remained for Prof. P. H. Rolfs to recognize its value and give it form. He and his staff have made it the splendid success which it now is. The Experiment Station is the only institution which could have done it.

As a means of bringing the citrus growers of the State together and imparting and securing exact scientific and other practical information, the Seminar is in a class alone. Matters discussed at these meetings have a most important bearing on the welfare of the industry and State. It is the clearing house for the very latest information on most phases of the business,

for it brings the growers together on such a footing that they can easily organize for co-operative work. A grower who once attends is pretty certain to come again and again, year after year.

After the formal opening addresses Tuesday morning, Professor S. E. Collison reported on the results obtained in some citrus fertilizer experiments he has under way. Professor B. F. Floyd gave an unusually interesting report on the relative importance of phosphoric acid and potash in fertilizers. It would seem that phosphoric acid was much more important as a plant food than potash, German propaganda to the contrary notwithstanding. The facts given were striking and convincing.

J. N. Harper explained the effects of the various fertilizer elements and emphasized the necessity of balancing formulas carefully to suit the needs of the crop on the particular soil on which it is growing. Mr. L. M. Rhodes of the State Marketing Bureau explained the work of that organization, defined its field of endeavor and offered its services to all.

In the afternoon Mr. F. L. Skelly discussed the marketing of the 1918 citrus crop. The outlook is indeed bright. J. R. Winston followed with a paper describing a method of "Field Testing of Copper Spray Coatings". Mr. Sanborn next gave an interesting talk on the "Feeding and Care of Chickens". Professor Stevens gave the last paper of the afternoon, entitled, "Citrus Diseases". It contained some new material, the results of investigations just completed.

At the conclusion of the afternoon program the people of Gainesville took the visitors out to inspect the Peanut Mill and the Gillett Oil Company plants north of town. The latter is the only government supported concern in the South for the manufacture of castor oil for the use of government aeroplanes.

The Wednesday program was one of exceptional interest throughout. Professor W. W. Yothers gave a report on "Some Miscellaneous Results". Dr. J. H. Montgomery, head of the Quarantine Department of the State Plant Board, presented this department's work very clearly. It may be described as the first line of defense against invading insect pests and diseases which have not yet succeeded in becoming established in Florida. Already several very destructive pests have been intercepted at points of entry by Quarantine Inspectors, namely the Black Fly, the West Indian Fruit Fly and the Sweet Potato Scarabee. It causes a cold perspiration when one realizes what

a narrow escape the State has had from introducing these pests and makes very clear the need of this department.

Dr. Montgomery was followed by Mr. O'Byrne, who spoke on the subject of "Nursery Inspection, Our Second Line of Defense". Some reasons were given for believing that the assistant nursery inspectors in the field were wide awake and alert.

Mr. E. L. Wartmann, member of the State Plant Board, in a few well chosen words, described the work of the Board itself in its efforts to protect the citrus industry in eradicating citrus canker and keeping out other insect pests and diseases. He emphasized the necessity of the farmers and fruit growers supporting the Plant Board and insisting upon the strict enforcement of the Plant Act and the Board's rules.

Mr. Wilmon Newell, Plant Commissioner, gave the opening address of the afternoon session. Though brief, it indicated forcibly the need for such an organization as the Plant Board, to be constantly on the alert to protect the growers' interests. The Black Fly, Pink Bollworm, Mediterranean Fruit Fly and other important pests were discussed and the menace which they offer the State was made very apparent. He also expressed the opinion that the time was near at hand when provision should be made for compulsory control of insects and diseases on private properties.

Immediately following Mr. Newell's talk, Dr. J. H. Ross asked for the floor. He commented on the great benefit derived from the efforts of the State Plant Board to date and stressed the need of a continuance of the work on even broader lines than heretofore.

J. R. Watson described an insect friendly to the grower because an enemy of the whitefly. He has succeeded in establishing this California insect in groves at three points in the State. He also discussed the life history and control of the pumpkin bug.

Mr. W. A. Dopson gave an instructive address on the present labor situation. Dr. Ross gave an interesting talk on "Organization for Grove Work".

At eight o'clock Wednesday evening, Hon. Clarence Ousley, Asst. Secretary of Agriculture, delivered a lecture which was an inspiration to everyone present. While his address was primarily of an agricultural nature, it was also a patriotic address which stirred the large audience to the very depths.



Thursday morning H. Harold Hume spoke on the subject of "War Gardens" and B. C. Skinner of Dunedin discussed the "Use of Tractors in Florida". M. J. Jarnagin discussed "The Feeding and Care of Horses and Mules".

The final number on the morning program was a discussion and demonstration of "The Care and Repair of Spraying Machine Parts". Various makes of spraying machines were backed into the tent where the meeting was held and H. C. Lassen, a spraying machine man himself, went over them one at a time illustrating his talk with the actual parts of the machine under discussion. Nothing finer in its line has ever been given at the Seminar. It was of tremendous practical value to every grower who operates a power sprayer, and that means every progressive grower in the State who has a grove of any considerable size.

The entire afternoon was devoted to a tractor demonstration at Daysville, two miles from Gainesville. Many makes of tractors were represented and each was given a five-acre strip to plow in competition with others. This gave an excellent opportunity for the various tractors to demonstrate their respective advantages. A large crowd spent the entire afternoon watching, questioning and commenting.

The evening was devoted to a patriotic meeting in preparation for the Fourth Liberty Loan, and a splendid patriotic address was given by Mr. Ousley.

Friday morning was the concluding session. As many of the citrus men were gone, the program was merged with the Live-Stock Roundup and subjects were selected which were applicable to both meetings. The program was concluded shortly before noon and the growers left on various trains of the afternoon, declaring to a man that it was the best Seminar they had attended.—F. M. O.





